IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	**Confirmation No. 9109**
Yoshiro SHIOKAWA	:	Docket No. 2001-0394A
Serial No. 09/824,211	:	Group Art Unit 2881
Filed April 3, 2001	:	Examiner Phillip A. Johnston

Q-POLE TYPE MASS SPECTROMETER

REQUEST FOR RECONSIDERATION OF FINAL REJECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In an Office Action dated July 11, 2003, the Examiner finally rejected claims 15-46 as being unpatentable over U.S. Patent 6,111,250 to Thomson et al. (Thomson). However, it is respectfully submitted that the present invention, as reflected in claims 15-46, clearly distinguishes over Thomson. Reconsideration is respectfully requested.

The nature of the present invention was discussed in the previous response, along with its differences with Thomson. It is believed that these differences still pertain, and that, not withstanding the Examiner's position, the claims distinguish over Thomson. This will be clarified below.

Thus, independent claim 15 recites a Q-pole type mass spectrometer in a reduced pressure gas environment in which the motion in an axial direction of ions to be measured, advancing from an ion source to a collector, is controlled within a Q-pole region at the same time that the ions to be measured are subjected to mass separation in the Q-pole region by Coulomb force in the diameter direction generated by a quadrupole high-frequency field. Thomson does not, in fact, control the motion of the ions in an axial direction of the ions to be measured, advancing from the

source to the collector, at the same time that the ions to be measured are subjected to mass separation in the Q-pole region by Coulomb force in the diameter direction.

Claim 31 recites four poles arranged to form a Q-pole region having an axis extending in an axial direction, with the poles extending along the axis, an ion source, and a collector. The four poles, the ion source and the collector incorporate means for controlling the motion in the axial direction of the ions to be measured, advancing from the source to the collector, in the Q-pole region, at the same time that the ions to be measured are subjected to mass separation, similar to the recitation in claim 15.

As discussed on page 9 of the previous response, in addition to an initial axial motion applied to ions that travel axially through the Q-pole region, the present invention controls the axial motion of the ions while the ions are in the Q-pole region and undergoing mass separation.

Thomson does not control the motion of the ions in an axial direction within a Q-pole region at the same time that the ions could be measured or subjected to mass separation by Coulomb force in the diameter direction. Quadrupoles Q0 and Q2 do not subject the ions to mass separation. Rather, they are used for collisional focusing for Q1 and Q3, respectively. From the discussion, for example from column 6, line 45, and column 8, line 23, etc., Thomson contemplates the invention for use with quadrupoles Q0 and Q2, and not Q1 or Q3. The point of Thomson is to reduce delay in the introduction of ions to Q1 and Q3 by improving Q0 and Q2.

More particularly, in Thomson the ions do not undergo mass separation in Q0 or Q2. In Q1 and Q3, there is no disclosure or suggestion in Thomson of controlling the axial motion of the ions. Thus, Thomson does not disclose or suggest a Q-pole region in which the motion of the ions is controlled in an axial direction at the same time that the ions could be measured or subjected to mass separation by Coulomb force in the diameter direction.

Even more specifically, as is clear from the abstract, Thomson discusses a mass spectrometer in which one of the rod sets creates an axial field. As discussed at the top of column 5, Thomson employs rod sets Q0-Q3. Note in particular the arrangement of Fig. 1, the prior art background of the Thomson invention. As discussed at about line 21 of column 5, rod set Q0 acts as an ion transmission device. As noted in line 36, rod set Q1 acts as an ion filter,

transmitting ions of desired mass or in a desired mass range, as is conventional. Rod set Q2 has collision gas from a collision gas source 58 and acts as a collision cell. Daughter ions formed in the collision cell of rod set Q2 are scanned sequentially through rod set Q3. Note line 50 of column 5. There is not disclosed or suggested a rod set in Thomson that controls the motion of the ions in the axial direction within a Q-pole region at the same time that the ions could be measured or subjected to mass separation by Coulomb force in the diameter direction.

The above discussion of what is in fact disclosed by Thomson appears to be largely reflected in the Examiner's discussion in the Office Action. The Examiner further discusses the disclosure in columns 8 and 9 of Thomson about quadrupole Q0 and the embodiment of Fig. 29 including high pressure entrance rod set 182 to direct ions to low pressure region 194 and time of flight drift tube 204. However, such does not disclose or suggest controlling the motions of the ions in an axial direction within a Q-pole region at the same time that the ions are measured or subjected to mass separation by Coulomb force in the diameter direction.

The Examiner states that the application potentials to quadrupoles in accordance with Thomson is equivalent to the use of Coulomb forces and space charge effects for mass separation. It is not entirely clear what the Examiner means by "equivalent." If the Examiner means that "equivalent" means that what Thomson is doing is in fact measuring or subjecting ions to mass separation by Coulomb force in the diameter direction, it has not been clearly established. In any case, there is no disclosure or suggestion or implication of such measurement or mass separation by Coulomb force taking place at the same time that the ions have their motion controlled in the axial direction within a Q-pole region.

In response to Applicant's arguments, the Examiner refers to Thomson, column 5, lines 36-38. The cited passage states "Rod set Q1 normally has both RF and DC applied to it, so that it acts as an ion filter, transmitting ions of desired mass (or in a desired mass range), as is conventional." Thus, as the Examiner interprets Thomson, appropriate RF and DC potentials are applied to rod set Q1 so that mass separation of the ions or ion filtering is provided in Q1 for the desired mass range.

Indeed, Applicant respectfully submits and believes that rod set Q1, having both RF and DC applied to it, is a conventional Q-pole type mass spectrometer, as for example described from line 13 of page 1 to line 18 in page 2 of the original English specification of the present application. As discussed with respect to the conventional Q-pole type mass spectrometer, there is no electric field applied in the axial direction and thus no control of the motion of the ions in the axial direction at this point. Thus, rod set Q1 does not result in control of the motion of the ions in the axial direction within a Q-pole region at the same time that the ions to be measured are subjected to mass separation by Coulomb force in the diameter direction. Rather, it appears from Thomson that motion is provided by one rod set, and measurement from another. In any case, there is no disclosure or suggestion of the combination as required by each of independent claims 15 and 31.

Thus, in view of the above, it is respectfully submitted that claims 15-46 distinguish over Thomson. Indication of such is respectfully requested. Further discussion of distinctions presented in the various dependent claims does not appear to be necessary in view of the clear distinction presented in each of the independent claims. However, Applicant reserves all their rights to otherwise address and traverse the rejections raised by the Examiner with respect to the dependent claims as necessary.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicant's undersigned representative.

Respectfully submitted,

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